



UNITED STATES PATENT AND TRADEMARK OFFICE

lm
UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,219	06/19/2001	Kars-Michiel Hubert Lenssen	NL 000361	3007

24737 7590 05/04/2004

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER

AURORA, REENA

ART UNIT	PAPER NUMBER
----------	--------------

2862

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/884,219

Applicant(s)

LENSSEN ET AL.

Examiner

Reena Aurora

Art Unit

2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

P r i d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/02/03.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3 - 11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3 - 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This communication is in response to amendment received on 12/02/3.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3 - 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (6,275,363) in view of Olivas et al. (6,507,187).

2. As to claim 1, Gill discloses (fig. 11, 12) a magneto-resistive device comprising a free (212) and a pinned (206) ferromagnetic layer separated by a non-magnetic spacer layer (304, fig. 12) therebetween. The pinned layer comprises a layer system having three (230, 232, 236) non-adjacent ferromagnetic layers in the form of a stack. The layers may all be Co or CoFe, or apparently any permutation thereof (fig. 12, 230, 232, 236). An exchange biasing layer (244) is adjacent the layer system and magnetically influences the layer system, wherein the free (212) and the pinned (206) ferromagnetic layers are separated by Cu type layer (304). Each of the intermediate layers (228, 234) is a Ru layer. Gill fails to disclose that the copper spacer layer is contiguous on both sides with a CoFe layer of the free ferromagnetic layer, and on another side being contiguous with the CoFe layer of the antiferromagnet layer system. Olivas et al. (fig. 2) discloses a multi-layer magneto-resistive device in which a copper layer (150) is

Art Unit: 2862

deposited between a Permalloy layer (130) and an iron managanese layer (170). The copper layer is contiguous on both sides with the cobalt layers (140, 160). The cobalt layers are deposited to separate the mixing of permalloy and copper and the mixing of iron managanese and copper (col. 7, lines 29, 30), and to prevent diffusion of the permalloy and copper and boost GMR ratio (col. 5, lines 10 - 12). Therefore, it would have been obvious to one skilled in the art at the time of the invention to provide the magnetoresistive device of Gill with CoFe layers contiguous on both sides of the copper layer in view of Olivas et al. Provision of such layers would be motivated by the desired goal of eliminating diffusion of Ni components at layers interfaces and enhancing the MR ratio of the device.

3. As to claims 3 and 6, Gill discloses anti ferromagnetic layer system having an odd number of non-adjacent ferromagnetic layers (230, 232, 236) greater than or equal to three (fig. 12).

4. As to claims 4 and 11, Gill discloses an anti ferromagnetic layer system including three non-adjacent ferromagnetic layers (23, 232, 236) and two intermediate non-magnetic, Ru (228, 234) layers, and all the three ferromagnetic layers are CoFe layers (fig. 12).

5. As to claim 5, Gill discloses the exchange biasing layer (244, fig. 12) is arranged between the substrate and the anti ferromagnetic layer system (206).

6. As to claims 7 and 8, Gill and Olivas et al. fails to disclose at least two ferromagnetic layers towards the outside of the stack are thinner or thicker than a ferromagnetic layer towards the center of the stack. However, making the

Art Unit: 2862

ferromagnetic layers of Gill's device outside the stack thinner or thicker than the center layer would have been obvious as desirable for optimum size of the device and the magnetic coupling requirements for the device. Therefore it would have been obvious to one of ordinary skill in the art to make Gill and Olivas et al. to make the outside stack thinner or thicker than the center layer would have been obvious as desirable for optimum size of the device and the magnetic coupling requirements for the device.

7. As to claims 9 and 10, Gill discloses that magnetoresistive devices of this type are conventionally manufactured for use in data storage systems and as magnetic memory (col. 4, lines 54 - 56).

Response to Arguments

Applicant's arguments filed on 12/02/032 have been fully considered but they are not persuasive.

Argument: page 4, last line "Gill patents, however do not teach that the Cu layer is contiguous to any of the CoFe layer of the pinned structure".

Response: Even though Gill fails to disclose that the copper spacer layer is contiguous on both sides with a CoFe layer of the free ferromagnetic layer, and on another side being contiguous with the CoFe layer of the antiferromagnet layer system. Olivas et al. (fig. 2) discloses a multi-layer magneto-resistive device in which a copper layer (150) is deposited between a Permalloy layer (130) and an iron managanese layer (170). The copper layer is contiguous on both sides with the cobalt layers (140, 160). The cobalt layers are deposited to separate the mixing of permalloy and copper and the mixing of iron managanese and copper (col. 7, lines 29, 30), and to prevent diffusion of the

Art Unit: 2862

permalloy and copper and boost GMR ratio (col. 5, lines 10 - 12). Therefore, it would have been obvious to one skilled in the art at the time of the invention to provide the magnetoresistive device of Gill with CoFe layers contiguous on both sides of the copper layer in view of Olivas et al. Provision of such layers would be motivated by the desired goal of eliminating diffusion of Ni components at layers interfaces and enhancing the MR ratio of the device.

Argument: page 5, line 10 – 13, “none of these three patents can provide a teaching or suggestion that the Cu layer, which separates the pinned layer and the free layer, is contiguous with the CoFe layer of an AAF layer”.

Response: Olivas et al. (fig. 2) discloses a multi-layer magneto-resistive device in which a copper layer (150) is deposited between a Permalloy layer (130) and an iron managanese layer (170). The copper layer is contiguous on both sides with the cobalt layers (140, 160). The cobalt layers are deposited to separate the mixing of permalloy and copper and the mixing of iron managanese and copper (col. 7, lines 29, 30), and to prevent diffusion of the permalloy and copper and boost GMR ratio (col. 5, lines 10 – 12).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2862

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reena Aurora whose telephone number is 571-272-2263. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on 571-272-2233. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Reena Aurora



N. Le
Supervisory Patent Examiner
Technology Center 2800